

REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Claim objections

Applicant has revised the language of claim 7 to which the Examiner has objected. The same changes have been made to claim 15, which used similar language.

Rejection under 35 USC §§ 102 and 103

Claims 1-7, 9-15 and 17-19 stand rejected under 35 USC § 102 as being anticipated by Mieher et al U.S. Patent Publication No. 2003/0048458. Claims 8, 16 and 20 stand rejected under 35 USC § 103 as being obvious from Mieher in view of Okita et al. U.S. Patent Publication No. 2003/0133088. Applicant respectfully traverses these rejections.

Claims 1 and 13

Applicant's claims 1 and 13 define a method for determining imaging and process parameter settings of a lithographic pattern imaging and processing system in which the dimensions of a first set of control patterns printed in a lithographic resist layer are measured at two or more locations on or within each pattern that correspond to different optimum focus settings. These dimensions are then correlated to the dose and focus settings of the pattern imaging system to produce dependencies.

Subsequently, the dimensions on subsequent sets of control patterns printed in a lithographic resist layer at two or more locations on or within each pattern, of which a minimum of two locations corresponding to different optimum focus settings match those measured in the first set, are measured. The effective dose and defocus values associated with forming the subsequent sets of control patterns are then determined by comparing the dimensions at the matching locations with the correlated dependencies.

Contrary to the Examiner's position, the Mieher patent publication does not disclose measuring dimensions of a first set of control patterns printed in a lithographic resist layer at two or more locations on or within each pattern that correspond to different optimum focus settings. The citations by the Examiner at paragraphs [0008] and [0009] simply do not disclose or suggest such measurement. Mieher does state at para. [0039] that "the points where different [exposure versus focus plot] contour lines intersect represent points of best focus and exposure." However, this is contrary to applicant's measurement in claims 1 and 13 of "optimum focus", which is defined in the specification at page 12, lines 8-10 to be where the rate of change of CD (critical dimension) with focus is zero – this is not where exposure versus focus contours intersect as in the Mieher reference calculation.

Applicant's invention as defined in claims 1 and 13 enables unambiguous analytic determination of dose and defocus, including the sign of the defocus. Mieher's vague generalities, which merely restate prior art methods, do not recognize

that multiple optimum focus positions may be measured on a single target, and therefore do not anticipate or render obvious applicant's invention of claims 1 and 14.

Claims 7 and 15

Claims 7 and 15 specify that the dimensions of the first set of control patterns printed in a lithographic resist layer are measured at locations on or within each pattern at or near the top of the thickness of the resist layer and at or near the bottom of the thickness of the resist layer. The dimensions on subsequent sets of control patterns printed in a lithographic resist layer are also measured at or near the top of the thickness of the resist layer and at or near the bottom of the thickness of the resist layer.

The Mieher patent publication discloses in its preferred embodiment the measurement of line width at 50% of line height (see paragraph [0100]), and does not disclose the measurement and comparison of dimensions both at or near the top of the thickness of the resist layer and at or near the bottom of the thickness of the resist layer. As applicant has explained on pages 16-19, and in the drawings in Figs. 4-7, dimension measurements made at the top and bottom of the resist layer thickness provide unexpected and advantageous ability compare the control pattern dimensions with the correlated dimensions, and solve for and determine the effective dose and focus values associated with forming the control patterns.

Accordingly, applicant's claims 7 and 15 are novel over the Mieher patent publication. Since Mieher likewise does not suggest measurement and comparison of width dimensions both at or near the top of the thickness of the resist layer and at or

near the bottom of the thickness of the resist layer, applicant's claims 7 and 15 are not obvious therefrom.

Claims 8, 16 and 20

Claim 8 is ultimately dependent on claim 1, and claims 16 and 20 are ultimately dependent on claim 13. The Okita publication does not remedy the deficiencies of the Mieher publication with respect to the base claims, and therefore does not render obvious dependent claims 8, 16 and 20.

Claims 21 and 22

Applicant has added new claims 21 and 22, dependent on claims 2 and 13, respectively, to make explicit the definition of best or optimum focus at each height as the focus setting at which the rate of change of critical dimension with focus is zero. This limitation on the measurement of the locations on the resist pattern of the optimum focus settings is not disclosed or suggested by the Mieher reference.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,



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